Environmental Aspects of Cellogreen Diacetate Film

Cellogreen is Celloglas' trade name for a range of films based on cellulose diacetate. The properties of these films reflect their cellulosic origins and thus offer an attractive combination of environmental features. Their cellulosic nature also means that cellogreen films are ideally suited to be used in contact with paper and board in packaging applications film-laminated to printed material.

Cellogreen - film manufacturing process

The diacetate raw material is produced by treating cellulose from woodpulp or cotton linters with acetic anhydride. The resulting flake is mixed with a small proportion of plasticiser and traces of anti-block compound and is cast onto a continuous band to produce a non-oriented film with exceptional optical properties.

The major raw material, cellulose, comes predominantly from woodpulp from managed forestry in North America and some cotton linters. All of the pulp suppliers have active replanting programmes and plant more trees than they harvest every year. Thus cellogreen is distinguished from most other thermoplastic films in that it comes from a sustainable resource and its main component is not derived from fossil fuels. The secondary raw material is acetic anhydride, a simple derivative of the everyday tabletop chemical, acetic acid.

A range of different plasticisers is used in cellogreen films, depending on the end use. These include glycerol triacetate (triacetin), which is itself a direct food additive and can be naturally derived.

Environmental legislation

The last few years has seen national and international legislation being introduced worldwide to minimise the environmental burden of packaging materials. In Europe, for instance, legislation is designed to reduce packaging levels wherever possible and to encourage re-use or re-cycling of materials, or alternatively composting or incineration with energy recovery. Targets have been set for recycling and recovery of packaging across the various material types - glass, metals, paper and board, plastics and others.

In the UK, each stage of the packaging chain must pay towards the ultimate recovery costs of post-consumer packaging. Cellogreen film is classified in the paper and board category in the UK, in view of its cellulosic base. As a consequence the levy on cellogreen is lower than that on other thermoplastic films, which are classified as plastics.

European legislation also calls for very low heavy metal content in packaging materials, in line with the US Coneg limits. Cellogreen has, for many years, complied with these levels.

Recycling with cellogreen

In principle cellogreen film is readily recyclable. It is easily re-dissolved and filtered for casting; to yield a first quality recycled film. Since the cellogreen film manufacturing process is relatively low temperature, no thermal degradation of the polymer occurs, as can happen with melt processed polymers. Thus virtually all in-house waste and worthwhile quantities of "waste" film are currently re-processed in the plant.

In practice cellogreen is usually used in combination with paper or board in packaging applications, either bonded around the edge of a window in a folding carton, or laminated to the surface of printed board. A number of possibilities arise:

Environmental Aspects of Cellogreen Diacetate Film

Because of its predominantly cellulosic nature, it is feasible that where the facilities exist cellogreen can be recycled along with paper in a re-pulping process. Some changes to the re-pulping conditions would probably be needed. However the easy availability of relatively cheap waste paper has meant that thus far there has been little economic incentive for waste paper producers to include board laminated with cellogreen films in their re-processing, but as legislation drives recycling targets ever higher, this is likely to change in the future.

If thin cellogreen film is laminated to board a further environmental benefit is available. With cross-linked adhesive systems the film can be separated from the board with adhesives and inks attached to it. This leaves a much cleaner pulp, free from "stickies" and ink particles, to be reprocessed. through to higher quality paper. The combination of film, adhesive and inks can be separated off and more readily dealt with e.g. by incineration with energy recovery.

Biodegradation and composting

Cellulose diacetate and the plasticisers typically used have long been recognised as biodegradable under appropriate conditions (for example in soil burial tests and sewage sludge cultures).
The rate of biodegradation under commercial aerated composting conditions is slower than typical organic compostables, but it may be that partially degraded film would add texture to compost, whilst continuing to biodegrade in use.
The base film used in cellogreen manufacture has recently been accredited with **DIN EN 13432** – the internationally recognised standard for compostability and biodegradation.

It should be noted that despite its inherent biodegradability, cellogreen film is very stable and does not break down in normal end-use conditions.

Incineration with energy recovery

Where mixed waste arises, in many cases the most sensible disposal option is to incinerate at high temperature with energy recovery, rather than to attempt to separate materials and process them down different waste streams. Fully combusted cellogreen film produces only carbon dioxide, water and a little non-toxic inorganic ash. It has a calorific value around 20MJ/kg, making it worthwhile to recover the energy for heating purposes.

Landfill

If alternative recovery options are not available, landfill remains as a disposal route. If put to landfill, cellogreen film will not produce any toxic chemicals which might leach out to the surrounding environment.

In summary

Cellogreen film is derived mainly from sustainable non-fossil fuel resources. Its cellulosic origin provides a number of attractive environmental options and gives it a unique versatility for packaging waste recovery.

Cellogreen is available from all Celloglas sites

For locations please visit:

celloglas.co.uk/print-finishing/lamination/cellogreen